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retained in its alimentary canal solid objects so small as are some of these pebbles. But it is known that the crocodiles have a peculiarly small pyloric orifice, wholly preventing the passage of solid bodies, and all such, when taken into the stomach, whether bones or stones, must necessarily be digested, or worn down to an extremely small size, before passing into the intestinal canal. In this respect the pebbles show conclusively a similar disposition of the parts in the plesiosaurs. The food of the plesiosaurs must necessarily have been, from the comparatively small size of the mouth and the absence of any special means to aid in deglutition, the smaller animals that abounded in or upon the water, and this fact may perhaps account for the need of a more active digestion. Certainly nothing short of a small stone quarry would have given material aid to the digestive forces of the mosasaurs.

Not the least interesting fact connected with these pebbles is the indication they present of a color sense on the part of the reptiles, or, at least, that they selected the most conspicuous ones. It has been suggested that the stones might have received their shape from the action of the water, and that they, hence, need not have been long in the animal's stomach. This, however, is highly improbable; there is too much uniformity of shape among the smaller ones to have been caused by the action of water. Furthermore, it would have been hardly possible for the animal to have picked up such small stones as many of them are, and it is very evident that the stones were not accidentally swallowed. It is very probable that the pebbles originally were nearly the size of one's fist.

Yet more interesting is the light that is thrown upon the geography of the Benton sea at the time of the animal's existence. The red quartzite is apparently identical with that from Sioux City, and it is Professor Haworth's opinion that they all came from this region, or the region of the Black Hills. This is interesting both as indicating the shore lines at that time and the roving propensities of the animals.

THE DESCENT OF FACIAL EXPRESSION.

BY ALTON H. THOMPSON, TOPEKA, KAS.

It is not a very flattering reflection, perhaps, that the major part of our boasted human nature is animal in its origin, development, and leading characteristics. We talk loftily of our elevation and superiority, and boast of the wonderful things our species has done, and of our wonderful intellectual accomplishments; and they are wonderful, but by a measure we do not like to apply—*i. e.*, by comparison with the greater line of animal ancestry which lies so close at our backs, rather than with the briefer human lines since our emergence from the animal stage. It is because we are so nearly animal yet that our advancement is, in many respects, so wonderful. We admit that our physical organization is entirely animal, and that our moral nature is largely animal yet in its instincts; for it has not thrown off the thraldom it yet endures, of the long æons of savagery and animalism from which we have but lately emerged. Indeed, the brief historic period has done but little to release us from the savage influences of our prehistoric ancestry. By special effort, perhaps, under the powerful influence of religious or other emotions, some few minds have been emancipated from this slavery completely, and others again but in part. Some of these become the pilots of their race in their struggle toward a higher and better life. These are the saviors of mankind, which are lifting the race upward into a higher moral atmosphere. But the task is Herculean, for the legacy of primitive morals is continually dragging it backward into the mire. But intellectually we are, of course, far in advance of our animal and savage ancestors, and are vastly removed from them, so that, mentally at least, civilized man bears but little resemblance to his lowly ancestry, and is quite another creature.

These high mental qualities are, however, resident in a body that is distinctly animal, although in its highest development the mind has had great influence in refining and beautifying the place of its residence. Especially has it refined and beautified the face, as the special seat of the outward expression of the mind and he emotions.

As the various parts of the face have, by the progress of gradual evolution of mind and body together, become the seat of special expression, we wish to notice some of the varieties presented by the features of the human face and their various expressions, and trace some of them back to their animal origin. This will, we trust, aid in the explanation, in a degree, of the extensive variation found in the faces and features of men, and of the endless differences that exist between faces, their forms and expressions, as between races of men and between individuals of the same race. We wish at the outset, however, to declare that this investigation is without any wish or even latent desire to detract from the dignity of our common humanity; but that the study is pursued only in a humble philosophic and scientific spirit. It is mainly with an earnest desire to contribute something toward the finding of a scientific basis for the study of physiognomy and expression, of which it at present stands so much in need, that such an effort is made.

We therefore submit our first postulate, that all human faces are but composites, more or less complete, of inherited characteristics that have been accumulating during the slow lapse of the ages. All the animal and human elements of the individual are but the legacies of his ancestry. Faces vary so infinitely; but when we consider that pure races are now unknown, and that intermixture has been the rule since long before the dawn of history, we cannot wonder at the facial variation that exists everywhere. All nations are more or less mixed, and so faces are more or less mixed, being composed of many racial elements. Variations and incongruity of features are mainly due to unequal development, induced by the conflict of different racial tendencies, and the omnipresent power of atavism, causing the reappearance of long-absent peculiarities of feature. This conflict brings about retardation in some features and acceleration in others, just as in various organs and parts of the body, which develop under the influence of the forces directing the evolution of the species. Some features remain more or less embryonic or infantile, and others bear a decided resemblance to primary animal types, especially with the quadrumanous and anthropoid forms. Others again are accelerated and much developed in man, and other features are much reduced, as compared with the lower primates. The quadrumana furnish many suggestions as to the origin of the human features—suggestions which, if followed up carefully, will furnish clues to many intricate problems of human physiognomy. We will therefore try to trace some of the human facial features and expressions back to earlier sources than even the pure races of mankind—back to their shadowy beginnings, their animal origin. To do this we will need to make comparisons with the contemporaneous quadrumana and embryonic facial forms, which show the features in their immaturity, and thereby study the embryology of expression and its descent.

Prof. E. D. Cope has brought this out to some extent in his chapter on "The Developmental Significance of Human Physiognomy." He says: "Many persons possess at least one quadrumanous or embryonic character, and the possession of quadrumanous characteristics by man approximates his form to that class, so far as the evidence goes. He may retain features which have been obliterated in other forms in the process of evolution. Then again, persons whose features possess any infantile characteristics are more embryonic in those respects than are others, and those who lack them have left them behind on the way to maturity. We have here two sets of characters in which men may differ from each other. In one set the characters are those of monkeys, in the other they are those of infants, and some peculiarities are characteristic of both sets. Characters of the face of monkey-like significance are usually the opposite to those included in the embryonic, but in both the facial region of the skull is larger as compared with the cerebral. Man stops short in the development of the face, and is so far embryonic. The Indo-European is the highest in those things which add to beauty, according to his own ideal. Increased size of the cerebrum and retardation of the face is a main characteristic. Quadrumanous indications are found in the lower classes of the most developed races. The status of a race is mainly determined by the percentage of its individuals who do, and do not, present the features in question. Some embryonic characters may also appear in individuals of any race."

Few faces have features that harmonize, and most faces have one or more features that are immature and incomplete, and that are really either quadrumanous or embryonic. A face in which all the features are matured and well developed and harmonious is beautiful because of the proportions and completeness. The ordinary face is generally degraded and unattractive because one or more of its features are incomplete and inharmonious. But to analyze the face properly, its different parts and features must be studied separately, so we will begin with the superior portion of the face, and take first the *forehead*. Professor Cope says (*op. cit.*): "The facial region of the skull is larger in the quadrumana, compared with the cerebral," the latter receding so that "the forehead is not full and prominent and is generally retreating." The low forehead is, regardless of its bearing on mental power, a quadrumanous characteristic, and the opposite, the high, full forehead, is the advanced, the human form. Sloping forehead is not necessarily a sign of mental weakness, but only of the reappearance of a quadrumanous feature, and when it is accompanied by a brown, transversely wrinkled skin and low-growing hair, the resemblance is altogether too suggestive to be pleasant. Still, retreating foreheads may be seen in some most distinguished men, and are no criterion of brain power.

From an embryological point of view, we notice in the fœtus and infant "that the cerebral part of the skull greatly predominates over the facial" (Cope). In the human infant, as in the young ape, the forehead is more full and rounded than in the mature form. In the embryo the forehead is disproportionately bulging and overhangs the face, so that a mature forehead that is too full is, in a sense, an embryonic form—*i. e.*, the proper growth of the face to the type of normal proportions has not been accomplished and the forehead retains its embryonic predominance. Perhaps, however, it is the survival of a quadrumanous form, as the little squirrel monkey of South America has a disproportionately full forehead—fuller than man himself. The embryonic fullness in all the primates may therefore be but the survival of a long-lost lower form, and be itself a reappearance.

Regarding the *eyebrows*, Professor Cope says (*op. cit.*): "The superciliary ridges are more fully developed in the monkeys, so that in man they are embryonic. Man stops short of completeness in the development of the lower face, and is so far embryonic. . . . The orbits of the eyes are smaller, except in a few species, and the superciliary ridges grow more from infancy to maturity than in man." In man the brow is much reduced, and is thus embryonic. In the great anthropoids the superciliary ridges are greatly extended, and in a few of the lower races of man are quite prominent, but in the higher races of man are reduced. They are thus rudimentary in man, but in occasional cases there is considerable development of the brow, so that it shelves outward like the anthropoids, which is a reappearance. The temporal ridges, as well as the sagittal ridge, are much developed in some of the anthropoids, as the gorilla, for the more extensive attachment of the temporal muscles, for giving greater power to the jaw. These ridges give a depressed appearance to the forehead, and a savage look. There is no reappearance of these ridges in man, unless it should be in an occasional example of the Mongoloid, Malay, or American Indian skulls, but it is very rare, and is perhaps only an anomaly.

"In infancy (Professor Cope, *op. cit.*) the superciliary ridges are not developed, and remain reduced through life," and their condition in the adult of mankind is therefore embryonic; the low eyebrow is merely an undeveloped feature.

The *eyes* are larger proportionately in the infant than in the adult, and are more prominent, the surrounding parts being undeveloped. With growth the eyeball recedes, owing to the bony socket developing about it. As compared with the quadrumana, the eyes differ but little as to external appearance and form. There may be a difference as to prominence or depression, but this is scarcely perceptible as between man and the monkeys and apes. Individuals vary greatly in all tribes and species. There is a great difference, however, as to the intellectual fire that lights the eye — the indefinite something that reflects the soul behind it. In this, as in his whole intellectual being, man is removed from the lower forms of life by a space whose vastness cannot be estimated.

The *nose*, Professor Cope says (*op. cit.*), "is without bridge in the quadrumana, and with short and flat cartilages. . . . The character of the prominent nose in the Indo-European man, with its elevated bridge, is a sort of acceleration, since it is a super-addition to the quadrumanous type from both standpoints of quadrumana and embryology, and is chiefly due, no doubt, to the greater development of the front of the cerebral part of the skull or ethmoid bone, which, developing later, carries the nasal bones forward with it. . . . In the negro the nose is flat, without a bridge, which is a quadrumanous character, and is a retardation of growth. . . . In the Bushman the flat nasal bones are coössified with the adjacent bones, as in the apes. . . . In the Mongols the nose is flat, with a bridge. . . . Many people, especially those of the Slavonic races, have more or less embryonic noses." Many races have the flat nose, with low bridge, or the bridge may be totally absent. Many individuals of the higher races have flat noses, but the bridge is, if normal, always present.

In the infant "the nose is without bridge and the cartilages are flat and short — quite quadrumanous, in fact." But the nose grows and develops more than any other feature of the face in the progress toward maturity. A well-developed — a "strong"— nose is a strong feature, and strengthens the face, gives character and force, but a small nose is a weak feature and makes a face appear weak. Many adult noses are small and undeveloped, are really "baby noses," and detract much from the beauty, harmony and impressiveness of the face. A noble face with a small, insignificant nose cannot be imagined. It is the imperial feature, and dictates the character of the face. A small nose is embryonic, and has stopped short in its course of development at an immature stage. It does not really mean weakness in character, however, but only that the face has inherited a past form and did not reach the full attainment of its type, and the result is inharmony and mediocrity. The omnipresent mediocrity of the sea of faces around us is due largely to the prevalence of immature noses.

Then again, many noses of to-day are distinctly quadumanous in some of the characteristics which they retain. The anthropoid nose is flat of bridge and crushed upward against the face, flattened and "stub nosed" in fact. This form is seen in many "stub" noses — "*retrousse*," if you please — where the nose is distinctly upturned and retracted, as often occur in Celtic, Negroid and Slav races, and sometimes in others. In the negro the wings are spread and enlarged also, as in the monkeys. Again, the American monkeys have noses with wide bases, with the nostrils set well upon the side; hence their name, *Platyrrhine*, wide nosed. The old-world monkeys have the nostril openings set close together beneath, and are called *Catyrrhine*, or narrow nosed. Now, it is not unusual, especially among negro and other low races, to see an approach to this wide-nosed form—a wide pillar between the nostrils, and the latter openings set more or less on the side of the nose. A slight approach to this is seen in very many individuals of the European races, and occasionally an instance that is quite pronounced. This is an inheritance—an interesting survival of a very low form, a form which even the old-world monkeys have passed over.

These survivals, or rather reversions, are interesting as showing that this important feature, when not typically developed in man, is only immature. It is an interesting organ also, in that its normal development in man is superior to that of other animals, and is due to accelerated growth. A fine, strong human nose is an acquirement of our species since its emergence from animalism.

By excessive and abnormal development the nose often simulates the proboscis of other animals, but the resemblance is merely accidental. Yet the physiognomists have made much of these resemblances as indicating the character of the individual—that it resembled the animal thus simulated. This is, of course, absurd; but the idea was quite popular in certain circles in former days. It was part of the old physiognomy.

Regarding the *cheeks*—the malar bones, the zygoma, etc.—Professor Cope says (*op. cit.*): "The cheeks are more prominent in the quadrumana. . . . In the negroid and Mongolian races the malar bones are quite prominent, which is a quadrumanous accelerated character. The malar bones are reduced in the Indo-European races, which is a retardation, and is an embryonic condition." Most low races have prominent cheek bones, and this peculiarity is usually an accompaniment of a low physical and mental stage. In the higher races the cheek bones are much reduced, so that the occasional reappearance of the high malar prominence among them detracts at once from the elevation of a face. Indeed, high cheek bones make a low face, and are a distinctly quadrumanous inheritance. So we find this feature prominent and conspicuous in most low races, and reduced and inconspicuous in the higher races—at least in the Indo-European races, which *we* are disposed to call the highest of mankind.

The reduction of the cheek bones in the higher races is not merely an accidental embryonic condition, such as occurs as a freak in the nondevelopment of the nose, for instance, so far as the individual is concerned; for "in the infant the malar bones are not prominent," and their retardation is a later human characteristic and their acceleration a quadrumanous characteristic. There is a peculiarity of the cheeks, however, that is often retained to maturity that is embryonic and a distinctly infantile feature, and that is the enlargement of the buccinator, the "sucking" muscle. The strong development of this muscle in the infant, for physiological purposes, gives the cheeks of the infant their excessive fullness, which, when the food habits change, become reduced by disuse (and inheritance) and the cheek falls in, making the face thinner. The retention to maturity of excessively full cheeks, of the fleshy part, is an embryonic feature, and gives to the face an infantile look. Yet a moderate fullness is much to be desired, as plump cheeks are the inseparable adjuncts of symmetry and beauty of the face.

Regarding the *jaws*, *mouth*, and *lips*, Professor Cope says (*op. cit.*): "The jaws in civilized man are so much retarded in development as to be quite embryonic as compared with those of the monkey and some of the lower races of man. Many of the latter are quite prognathous, and thereby approach the quadrumanous type; but civilized jaws stop short of the full development of the anthropoid form. That is, in the monkeys the jaws are more prominent than in man, and as this results from a fuller course of growth from the infant, it is evident that in these respects the apes are more fully developed than man. The reduced jaws are characteristic of retardation. In the negro and Mongolian we notice that there is a predominance of the quadrumanous features (prognathous jaws) which are retarded in the Indo-European; and that the embryonic characters which predominate in the last (orthognathous jaws) are more accelerated in the others. In the negro the edges of the jaws are prominent—a quadrumanous characteristic; in the higher races the alveolar borders are reduced. . . . The edges of the jaws are more prominent in the quadrumana. . . . In the monkey the jaws grow more from infancy to maturity than in man." Prognathism is a quadrumanous character, and its opposite, orthognathism, a human character. The teeth project in most low races, and are more vertical in most civilized races, and this adds to the character of the jaws, whether prognathous or orthognathous. These characters are very constant as racial features, there being but infrequent individual deviation from the racial type, and perhaps only in the higher races, in the cases of congenital idiots, who sometimes have prognathous jaws, owing largely to the nondevelopment of the brain case. Darwin says ("Descent of Man"), quoting Vogt: "Microcephalous idiots have a smaller brain, less complex convolutions, the frontal sinus is largely developed, the jaws are prognathous to an *effrayant* degree; so that these idiots somewhat resemble the lower types of mankind." Indeed, prognathism and a small brain case, or orthognathism and a large brain and prominent forehead, bear a constant relation to each other. In the higher races, with greater mental power, the brain is larger—at least the fore brain—and causes the brain case to grow forward and overshadow the jaws, which are correspondingly and synchronously reduced. And, *vice versa*, prognathous jaws project forward of the brain case, which is reduced and smaller. Thus it is that small, orthognathous, vertical jaws and large brain go together, and large, prognathous jaws and small brain together, as more or less constant racial characteristics.

"In the infant the alveolar borders are not prominent. . . . The faces of some people are partly embryonic," in having a short face and light lower jaw. Such faces are still more embryonic when the forehead and eyes are prominent. "Retardation of this kind is most frequently seen in children, and more frequently in women than in men." An undeveloped, retracted lower jaw is an embryonic form sometimes seen.

In the quadrumana "the mouth is small and the lips thin. . . . The strong, convex upper lip, as frequently seen among the lower races of Irish, is a modified quadrumanous character" (Cope, *op. cit.*), and is quite constant in their descendants. The lips are distinctly cleaner and finer cut in the higher European races than in the lower races of man, and the oral opening is smaller. A large, wide opening to the mouth, with coarse lips, is a low type, and, when associated with depressed corners, is positively quadrumanous. These forms are often seen in low races, and sometimes reappear in individuals of the higher races. The lips are coarse and shapeless in all low races, and the finely-carved lip is a distinct mark of superior organization. In the quadrumana the lips are thin and infolded, showing but little of the mucous membrane. Thus, a mouth that is wide and much depressed at the corners, with thin lips and a long, stiff upper lip, is positively quadrumanous. The inheritance is direct. The thick lip, that shows much of the mucous membrane folded outward, is embryonic. It is infantile, and remains as a permanent feature in most lower races, and in some individuals of the higher races. It is the remains of the nursing period, like the developed buccinator muscle.

"The chin is retreating in the quadrumana, . . . and a retreating chin in man is a marked monkey character" (Cope, *op. cit.*); that is, a chin that is retreating from the alveolar border backward, as a normal condition, and not as a result of the accidental lack of development of the lower jaw, or a lingering embryonic form. The lower jaw is somewhat inconstant, and may be very small or very large as compared with the rest of the face, leading to malposition and irregularity of the teeth, as frequently observed by dentists, and the complete alteration of the expression of the mouth. But the chin, as a distinct feature, is independent of the form of the jaw, and occurs as a part developed upon and added to it—the part known as the bony symphysis of the lower jaw. It is a powerful and expressive feature in man, and serves much to give character and impressiveness to the face. A bold, strong chin gives strength to a face, and a weak, retreating chin weakens a face as much as a weak, embryonic nose.

The chin is a distinctively human feature. Mivart ("Man and Apes") says: "A striking feature of the human skull is the prominence of the inferior margin of the lower jaw in front, *i. e.*, the presence of the chin. The feature is quite wanting in the gorilla, orang, and chimpanzee"—in fact, in all the quadrumana, except a slight approach to it in the siamang. This is easily observed by comparisons of the skulls of monkeys and man. Even the lower races of man have, as a rule, retreating chins, especially when there is prognathism present, and, like that, it is a quadrumanous feature.

The descent of the *movements of expression* is an interesting part of our subject and opens a wide field, the study of which may enable us to find the origin and trace the descent of many of the expressive movements of the face of man. We notice first that many animals express emotions by the motions and movements of parts which with man have become obsolete or were never used by his ancestors. Thus, the horse expresses his feelings—anger, fear, etc.—most plainly with his ears; the expressive organ of the dog is the tail; the cat expresses her feelings by the arching of the back and the movements of the tail and ears, and the standing hairs are expressive in both cat and dog. There are other expressive movements that lie outside of the facial features, but with these we will have nothing to do at present. The eyes are expressive in all animals, and in that they much resemble man.

Facial expressions, the movements of the face, were undoubtedly developed with the growth of the mind, as new emotions and mental faculties were called into existence which demanded expression. The first expression of the feelings or of the ideas was sign language, and facial expression remains with man as a rudiment of that means of communication, before the origin and development of language, for sign language is used even by animals, in expressive movements of different parts of the body, which are well understood.

Charles Darwin says ("Expression of the Emotions in Man and Animals") that he "attended as closely as possible to the expression of the several passions of animals, as affording the safest basis for generalizations on the causes or origin of the various movements of expression. . . . It seems probable that the habit of expressing our feelings by certain movements, though now rendered innate, had been in some manner gradually acquired." Again he says ("Descent of Man"): "The relative position of our features (as compared with the quadrumana) is manifestly the same, and the various emotions are displayed by nearly similar movements of the muscles and skin, chiefly above the eyebrows and around the mouth. Some few expressions are, indeed, almost the same, as in the weeping of certain kinds of monkeys and in the laughing noise made by others, during which the corners of the mouth are drawn backward and the lower eyelids wrinkled. The external ears are curiously alike. In man the nose is much more prominent than in most monkeys;

but we may trace the commencement of an aquiline curvature in the nose of the Hooloch gibbon, and this in the *Semnopithecus nasica* is carried to a ridiculous extreme."

Or again, Darwin says ("Expression of the Emotions"): "When animals suffer from an agony of pain, they writhe and utter piercing cries and groans. With man the mouth may be closely compressed, or the lips retracted and the teeth ground together. Many animals grind the teeth in pain. When a chimpanzee is pleased or being tickled, a decided chuckling or laughing sound is uttered, the corners of the mouth are drawn backward, and the lower eyelids may be slightly wrinkled, but the teeth are not exposed. Their eyes sparkle and grow brighter. Young orangs, when tickled, likewise grin and make a chuckling sound, and an expression like a smile passes over the face. . . . When given a choice morsel, the corners of the mouth are raised in a slight smile of satisfaction. The same movement expresses pleasure in meeting a person to whom the monkey may be attached." Dogs often retract the corners of the mouth and raise the lips when pleased, or when displaying affection or delight. "In anger or fear, the lips of the monkeys are sometimes drawn up and the mouth opened and closed to show the teeth," to frighten the enemy by threatening biting. "Some species, when irritated, part the lips and gaze with a fixed and savage stare. Then the crest of long hairs on the brows may be drawn backward," and the brows be raised and lowered rapidly. "Some species of monkeys expose the teeth, others purse the mouth so as to conceal them, or pout the lips forward. Indeed, the movements of the features are really the same as those from pleasure; . . . others grow red in the face when enraged; others move the eyebrows rapidly up and down when excited. . . . Young orangs and chimpanzees protrude the lips greatly also when displeased. Young orangs often kiss each other. . . . The higher apes raise the eyebrows, and the forehead becomes, as with man, transversely wrinkled. In comparison with man, their faces are less expressive, chiefly owing to their not frowning under many emotions of the mind. Frowning, which is one of the most important of all the expressions in man, is due to the corrugating muscle of the forehead; but though the apes possess this muscle, they rarely frown, at least conspicuously. . . . The gorilla, when enraged, erects the crests of hair, depresses the lower lip, and utters terrific yells. The great power of movement of the scalp of the gorilla and of some other of the quadrumana demands notice in relation to the power still possessed by some men, through inheritance by reversion or persistence, of voluntarily moving the scalp. . . . Astonishment is not expressed by wide-open mouth by the monkeys, as with man."

In summing up his observations, Mr. Darwin says: "That the chief expressive actions exhibited by man and the lower animals are now innate and inherited—that is, have not been learned by the individual—is admitted by every one. So little has learning or instruction to do with some of these, that they are from the earliest days and throughout life quite beyond our control. . . . Many of our most important expressions have not been learned; but it is remarkable that some, which are certainly innate, require practice in the individual before they can be performed in a full and perfect manner. . . . Slight movements, such as the wrinkling of the forehead in grief, or the scarcely preceptible drawing down of the corners of the mouth, are the last remnants or rudiments of strongly marked and intelligible movements. They are full of significance to us in regard to expressions, as are all ordinary rudiments to the naturalist in the classification and genealogy of organic beings." Then again, many movements of the face in lower forms are but the beginnings, the embryonic origin, of expressions that are highly developed in man, as, for instance, the action of laughing. Of this movement we can see but the beginning, the suggestion, in lower animals. Indeed, man has been described as "the only animal that laughs," for he alone gives the movement full play. So with frowning, expression with the eye, and other facial expressive movements which are undeveloped in lower forms, but have their origin there.

Then again, the higher grades of expression, those expressions of the higher emotions and intellectual processes, must have arisen after the emergence of man from the animal stage, as the animals furnish us few suggestions of them, or of the probable source of their origin, or path of development. Such expressions are the human part of the face—that which lifts it beyond and sets it apart from the animals below it. Under this head come the finer expressions of the mouth and face, which accompany that highest intellectual accomplishment, intelligible speech. Man does not indulge in the coarse movements of the mouth, as excessive pouting or strong retraction of the lips, showing the teeth, etc. (except when under very strong feeling, or as children, who employ such extreme actions), but the mouth is more under restraint, and expresses the finer grades of feelings and emotions which have come into existence since man became a different being, and to which the lower animals are strangers. The acquisition and development of articulate speech has led to the modification of some animal expressions and the refinement of others, and the creation of still others entirely new. But the differentiation of these is impossible in the present state of imperfect data and absence of close observation. The study of comparative expression opens up a field that is very inviting and would be fruitful of results to the careful observer.

But, of the philosophy of expression, Mr. Geo. Romanes says that "in animals as in man there is obviously a 'logic of feelings' that is translated into a 'logic of signs.' This logic of signs, in its higher development, has exclusive reference to the representative faculties, and is first evoked by those exigencies of life which rendered necessary the communication of ideas. The germ of the sign-making faculty occurs among animals as far down as the ant, and is highly developed among the higher vertebrates. Pointer dogs make signs, terriers 'beg' for food, and the cat, dog, horse and other animals make signs. The animal is capable of converting the logic of feelings into the logic of signs for the purpose of communication, and it is a sign language as much as that of the deaf-mute or savages." From these beginnings the principle of communication arose, signs and gesture language were developed, and facial expression, as an auxiliary of gesture language, was evolved.

Facial expression is, then, in its last analysis, sign language. It belongs to the realm of "gesture speech"—communication by gestures of the features. As Mr. Garrick Mallery says, in his contributions to the study of sign language (Report of Bureau of Ethnology, Vol. I), "Gesture speech is divided into corporeal motion and facial expression. . . . A play of features, whether instinctive or voluntary, accentuates and qualifies all motions intended to serve as signs, and strong instinctive facial expression is generally accompanied by action of the body or some of its members. But, so far as distinction can be made, expressions of the features are the result of emotional and corporeal gestures of intellectual actions. The former in general and the small number of the latter that are distinctly emotional are nearly identical among men, for physiological causes which do not affect with the same similarity the processes of thought. The large number of corporeal gestures expressing intellectual operations require and admit of more variety and conventionality. . . . Sign language necessarily includes and presupposes facial expression when the emotions are in question. . . . The earliest gestures were doubtless instinctive and generally emotional, preceding pictorial, metamorphic and conventional gestures, which in turn preceded articulate speech, according to Darwin. . . . While it appears that the expressions of the features are not confined to the emotions, the movements of the hands or arms are often modified or accentuated by associated facial changes. These infuse life into the skeleton sign and belong to the class of innate expressions. . . . Emotional expression in the features of man is to be considered in reference to the fact that the special senses either have their seat in or in close relation to the face, and that so large a number of nerves pass to it from the brain." He describes several instances where complete conversation has been carried on by facial expression alone, showing the possibilities of intellectual as well as of emotional expression of the face.

Facial expression differs from sign language in that the latter, like oral speech, has become conventional among tribes by whom it is extensively employed; but the former still bears its primitive graphic and representative relations to thought and feeling. It pictures feeling, illustrates thought, and is, therefore, the remains of the original, primitive sign language, which was pictographic. Sign language and its analoge, facial expression, "are so faithful to nature that they will endure, while vocal speech will undergo many vicissitudes of development and retrogression." Being among the earliest evolved expressional habits, facial expression will be among the last to change, while oral speech and our sign language will become conventionalized, and undergo many changes, so as to lose all resemblance to idiographic signs. Facial expression is part of the natural sign language, and consists largely of hereditary impulses left over from a primitive state. So the signs given by the features, indicative of what is going on within the mind, are direct and simple. Even children — babies — notice the expressions of the face, and judge of the intentions of persons toward them. The power to read signs is of course an hereditary instinct, just as the sign language of the face is hereditary. Both came down from an epoch in the evolution of the race when articulate speech was undeveloped and even gesture language was unconventionalized.

NOTES ON THE CORN-ROOT WORM.

(*Diabrotica longicornis* Say.)

BY S. J. HUNTER, WAVERLY, KAS.

This corn pest has been known in the State for 10 years. The following notes, comprising my observations of this year on the workings of the pest in a single locality, reveal the very considerable damage which may be done by the pest. If the corn-growing region of the State were generally so badly infested, the loss would be enormous.

My observations were made in the northeast corner of Anderson county. The pest was first noticed in the neighborhood three years ago, on a farm bordering on Franklin county. Mr. Guard, the owner of the farm, stated that the insects have been increasing each year, so that this year his corn will not average more than one-third of a crop. One-half mile south of this farm there is a ridge of high prairie land four miles long, running east and west. On the west end of this ridge Mr. Stidham owns a farm. Mr. Stidham said he had not noticed the pest in his corn until this year. About the middle of June the corn on 30 acres of his land stopped growing and began to turn lighter in color. Upon examination, he found a worm at work at the roots, cutting each of the roots off at about two inches from the stalk. The "bite," he said, in every case seemed to poison the rootlet so that a kind of tubercle formed on the end, and no further growth took place from the rootlet. The worm he described as white, very short and slender when young, but when grown it was